CAIT
Center for Advanced Infrastructure & Transportation
Rutgers, The State University of New Jersey

QUARTERLY PROGRESS REPORT

Project Title:	Implementation of Weigh-In-Motion (WIM) Systems
RFP NUMBER:	NJDOT RESEARCH PROJECT MANAGER: Nick Vitillo
TASK ORDER NUMBER/Study Number: 92 / 4-23941	PRINCIPAL INVESTIGATOR: Dr. Ali Maher
Study Start Date: 06/14/2000 Study End Date: 06/14/2002	Period Covered: 2nd Quarter 2002

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Literature Search	10%	20%	100%	10%
1. Packaging	17%	15%	95%	16.2%
2. Testing	14%	25%	85%	11.9%
3. Site Determination	11%	20%	60%	6.6%
4. Field Implementation & Calibration	16%	14%	42%	6.7%
5. Monitoring and Analysis	22%	0%	0%	0%
Final Report	10%	0%	0%	0%
TOTAL	100%			51.4%

1. Progress this quarter by task:

A. We have been working on improving the compactness of our sensor model, because there are many wires that need to be attached to sensor. That way it will be more resistant to damage during the transportation and installation. We came up with idea of pre-encapsulating the sensor. First, the plastic bar is selected. Than the groove is cut in the bar, around 0.65" wide. Then the places for plastic chairs are drilled in the bar. Then the bar is cut in half through the middle of the groove. Through the bottom part are drilled holes for screw so the mold can be assembled. Ends of grooves are closed with wooden or plastic flat pieces. Now the mold is ready. Then the chairs are put on their places and the sensor with wires on top of them. Then the epoxy is prepared and poured into the mold. Now sensor is encapsulated. When epoxy is hardened, the sensor is compact and less fragile and it is ready for transportation and installation.

B. We have been testing encapsulated sensor in APA machine. We tested two variations of packaging. First is without pre-encapsulating and the other is with pre-encapsulating. The sensor were then put in the asphalt bricks and encapsulated. We found out that the shape of the signal was satisfying but the APA machine does not have a heavy enough weight to accurately test our sensor. So, we decided that we should abandon in-lab testing and approach to the field-testing.

C. We worked with Nick Vitillo to determine the resolution of our sensor for wheel path analysis. This resolution is important because we want to track how stress is distributed horizontally across a segment of pavement. Later, this information could be very useful in designing pavements. The decision was that it would be eight sensors in one. One and a half feet long on the sides and four sensors of half a feet long in the middle. All together six feet.

D. There was also a problem regarding the signal input. The signal was floating and that was not acceptable to us, because it would be very hard to find changes in voltage when the pressure is applied. We worked that out with help of people from National Instruments. We had to ground the signal and add resistors in the circle to make the input signal stable.

E. After that we started to code in LabView, which is pretty sophisticated and complicated programming language. We contacted people from National Instruments and some former students to give us some advice. We manage to create a model that will measure the outputs from sensors and to calibrate the final product, although the model needs some corrections, at this stage it is sufficient.

F. We are working with Dr. Gucunski and Dr.Zaghoul to install the sensor in the field, since they were doing testing regarding WIM technology so their opinion and experience would be very useful for us. We are considering several sites for installation the sensor in the field and they are ranging from weigh stations to on campus roads and parking lots.

2. Proposed activities for next quarter by task

A. We will start with the field-testing of the sensor.

B. We will continue working with various NJDOT personnel to get their input into the study. It is our intention to develop a sensor that can be utilized by the NJDOT. We would like to get as much data from personnel that have experience with this type of sensor and utilize their experiences to help customize the sensor functionality.

3. List of deliverables provided in this quarter by task (product date)

N/A

4. Progress on Implementation and Training Activities

A. Packaging of the sensor has almost been completed. The packaging has been one of the biggest problems, because the sensor has to give enough protection and stiffness yet still enough flexible not to have impact on the output.

5. Problems/Proposed Solutions

A. Calibration of the sensor will be difficult. The voltages produced by the sensor will be measured accurately but what exactly that voltage means cannot be determined until a field calibration is calculated. The best thing would be to install our sensor near the static scale inside the weigh station, so we have good reference to our readings.

6. Budget Summary*

Total Project Budget(# of years)	2 Years	$194,500.00
Total Project Expenditure to date		$96,276
% of Total Project Budget Expended		50%
Task Order Number/Study Number:		92 / 4-23941
Current Task Order Budget (# of years)	Year 1 and 2	$194,500.00
Actual Expenditure to date against current task order		$96,276
% of current task order budget expended		50%

* These are approximate expended amounts for the project; these estimates are for reference only and should not be used for official accounting purposes. For a more accurate project accounting please review the quarterly invoice for this project.